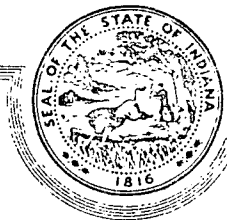


# STATE OF INDIANA



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## DEPARTMENT OF NATURAL RESOURCES GEOLOGICAL SURVEY

611 NORTH WALNUT GROVE  
BLOOMINGTON, INDIANA 47401

AREA CODE: 812  
TELEPHONE 337-7785

November 8, 1972

### PROGRESS REPORT NO. 2

September 1, 1972 - October 31, 1972

E72-10193  
CR-128391

A. TITLE: Study of Application of ERTS-A Imagery to Fracture-Related Mine Safety Hazards in the Coal Mining Industry (P-187)

B. PRINCIPAL INVESTIGATOR: Dr. Charles E. Wier (SR #325)

C. PRINCIPAL CONTRIBUTORS: Dr. Charles E. Wier, IGS  
Dr. Frank J. Wobber, Earth Sat  
Mr. Orville R. Russell, Earth Sat  
Mr. Roger V. Amato, Earth Sat

#### D. SUMMARY OF ACCOMPLISHMENTS:

- Fracture (lineament) analysis of the 1971 Corn Blight color infrared imagery has been completed by EarthSat and the data is in the process of being transferred to 1:250,000 base maps.
- Compilation of coal mine accident data has been completed by IGS and is being plotted on base maps to pinpoint high accident areas.
- Field measurements are being made by IGS of the strike and dip of joints exposed during coal mining. These data will be incorporated into the fracture map.
- Underground mine configurations are being evaluated for indications of roof instability. These data will be plotted on maps and compared with fracture data from ERTS and high altitude aircraft imagery.
- Underflight support was provided by NASA in the form of radar imagery and 1:20,000 scale color and color infrared photography. A prime objective of this underflight was to acquire evidence of mine subsidence as well as the detection of structural lineaments. Radar data requires additional analysis by EarthSat; however, tentative results indicate that the resolution of the radar imagery is probably too low to reveal the minor irregularities associated with mine subsidence. Linear stream segments, probably structurally controlled, can be identified on the imagery.

(E72-10193) STUDY OF THE APPLICATION OF  
ERTS-A IMAGERY TO FRACTURE-RELATED MINE  
SAFETY HAZARDS IN THE COAL MINING INDUSTRY  
C.E. Wier, et al (Indiana Geological  
Survey) 8 Nov. 1972 3 p

N73-10372

Unclas  
00193

CSCS 08K G3/13

The color and color infrared photography is of excellent quality. Both types of photography contain a wealth of detail concerning surface mining and its effect on the environment. The occurrence of acid mine drainage (AMD) is evident as is the state of reclamation of the mined lands. Lineaments detected on this imagery are a function of photo scale, i.e., lineaments identifiable at this scale are not always detectable on the 1:120,000 corn blight imagery. Conversely, lineaments found on the small scale imagery may be too subtle in signature across the large scale imagery to be recognized.

E. SIGNIFICANT RESULTS:

1. Using ERTS imagery just received, we judge stream control by joints or fractures to be identifiable in till covered areas.
2. Surface mined areas are readily identifiable on ERTS imagery if not revegetated. The degree of revegetation necessary to obscure an area as mined land, will continue to be investigated. ERTS imagery is being used to update the "Areas Strip Mined for Coal" map of the coal field in the state of Indiana.

F. PROBLEMS:

1. Evaluation of the contribution of ERTS imagery to mine hazards predictions has been handicapped by the lack of cloud free imagery. The best imagery thus far received was acquired on 25 August and was received on 26 October; such delays reduce the opportunity to report significant results. Evaluation has further suffered from lack of receipt of complete image sets in the formats specified in the Standing Order.

G. CHANGES TO STANDING ORDER FORMS:

Changes to the Standing Order have been requested to incorporate 70mm and 9-1/2" positive transparencies.

Data Request Forms have been submitted as follows:

<u>Number</u>	<u>Date</u>	<u>Product</u>	<u>Purpose</u>
1	10/2	Digital Tape	Mined Analysis
2	10/31	70mm & 9.5" Positive Transparency	Fracture Analysis

H. OVERVIEW OF INVESTIGATION:

Progress in the compilation of background data and analysis of aircraft-acquired imagery is on schedule. The evaluation of ERTS data has been handicapped by the lack of cloud free imagery. Imagery received, however, shows that significant structural lineaments are identifiable despite till cover and that surface mined areas can be analyzed for state use. Good quality ERTS imagery will make a valid contribution to mine safety and mine reclamation studies in Indiana.

PROGRESS REPORT SUMMARY

Reporting Period:

July 1, 1972 - Oct. 31, 1972

Category: 3-Mineral Resources, Geological Structure and Land Form  
Surveys

Sub-Category: L-Mine Safety, Hazard Survey, and Disaster Assessment

Title: Study of Application of ERTS-A Imagery to Fracture-Related Mine  
Safety Hazards in the Coal Mining Industry

Principal Investigator: Dr. Charles Wier

Co-Investigator: Dr. F. J. Wobber

Summary:

Various data compilation and analysis activities in support of ERTS-1 imagery interpretation are in progress or are completed. These include the compilation of mine accident data, areas of mine roof instability and the analysis of high-altitude color infrared photography and low-altitude color and color infrared photography which was acquired by NASA in support of the project. The photography reveals that many fracture lineaments are detectable through a varied thickness of glacial till. These data will be compiled on a series of 1:250,000 scale base maps and evaluated for a correlation between fracture zones and mine accidents and rooffalls.

Due to high occurrence of cloud cover in the project area and to the delay in imagery shipments, little progress has been made in the analysis of ERTS-1 imagery.